

WHAT IS CLAIMED IS:

1. A stackable tumbler including a base, a sidewall and an upper aperture prepared by blow-molding an injection molded preform wherein the preform is expanded axially as well as radially, the tumbler having a Rigidity Index of greater than 1.25 lb_f fluid-oz./gram at 2/3 cup height and ¼ inch sidewall deflection.
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2. The stackable tumbler according to Claim 1, having a Rigidity Index of at least 1.3 lb_f fluid-oz./gram at 2/3 cup height and ¼ inch sidewall deflection.
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3. The stackable tumbler according to Claim 2, having a Rigidity Index of at least 1.35 lb_f fluid-oz./gram at 2/3 cup height and ¼ inch sidewall deflection.
4. The stackable tumbler according to Claim 3, having a Rigidity Index of at least 1.4 lb_f fluid-oz./gram at 2/3 cup height and ¼ inch sidewall deflection.
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5. The stackable tumbler according to Claim 4, having a Rigidity Index of from about 1.4 to about 2 lb_f fluid-oz./gram at 2/3 cup height and ¼ inch sidewall deflection.
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6. The stackable tumbler according to Claim 1, having a Rigidity of at least 4 lb_f at 2/3 cup height and 1 inch sidewall deflection.
7. The stackable tumbler according to Claim 1, having a Rigidity of at least 5 lb_f at 2/3 cup height and 1 inch sidewall deflection.
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8. The stackable tumbler according to Claim 1, wherein the crystallinity of the sidewall of the tumbler is generally uniform over its sidewall.
- 30 9. The stackable tumbler according to Claim 1, comprising a PET polymer.

10. The stackable tumbler according to Claim 9, consisting essentially of PET having a crystallinity of at least about 20% at its sidewall.
- 5 11. The stackable tumbler according to Claim 9, wherein the crystallinity of the sidewall of the tumbler is generally uniform over the sidewall.
12. The stackable tumbler according to Claim 11, wherein the crystallinity of the sidewall is at least about 25%.
- 10 13. The stackable tumbler according to Claim 1, including a fortified rim about its upper aperture.
14. The stackable tumbler according to Claim 1, wherein the tumbler has a blow-up ratio of at least about 3 with respect to the preform.
- 15 15. The stackable tumbler according to Claim 14, wherein the tumbler has a blow-up ratio of at least about 5 with respect to the preform.
16. The stackable tumbler according to Claim 15, wherein the tumbler has a blow-up ratio of from about 7.5 to about 14 with respect to the preform.
- 20 17. The stackable tumbler according to Claim 16, wherein the tumbler has a blow-up ratio of from about 9 to about 12 with respect to the preform.
- 25 18. The stackable tumbler according to Claim 1, wherein the tumbler has a generally circular cross-section.
19. The stackable tumbler according to Claim 1, wherein the tumbler has a cross-sectional shape selected from the group consisting of non-circular ovals, rounded polygons and combinations of curved and linear segments forming a closed perimeter.
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20. A stackable tumbler produced by blow-molding a preform consisting essentially of polyethylene terephthalate wherein the preform is expanded radially and axially to form the tumbler which is characterized by a sidewall, an upper aperture and a base wherein the upper aperture is of generally larger area than the base and the sidewall is provided with a fortified rim around the upper aperture and wherein further the tumbler has a Relative Cup Rigidity of greater than 1.25 lb_f fluid-oz./gram at 2/3 cup height and 1/4 inch sidewall deflection.
21. The tumbler according to Claim 20, wherein the tumbler has a blow-up ratio of at least about 3 with respect to the preform.
22. The tumbler according to Claim 21, wherein the tumbler has a blow-up ratio of at least about 5 with respect to the preform.
23. The tumbler according to Claim 22, wherein the tumbler has a blow-up ratio of from about 7.5 to about 14 with respect to the preform.
24. The tumbler according to Claim 23, wherein the tumbler has a blow-up ratio of from about 9 to about 12 with respect to the preform.
25. The tumbler according to Claim 20, wherein the tumbler has a Relative Cup Rigidity of at least 1.3 lb_f fluid-oz./gram at 2/3 cup height and 1/4 inch sidewall deflection.
26. The tumbler according to Claim 25, wherein the tumbler has a Relative Cup Rigidity of at least 1.35 lb_f fluid-oz./gram at 2/3 cup height and 1/4 inch sidewall deflection.

27. The tumbler according to Claim 24, wherein the tumbler has a Relative Cup Rigidity of at least 1.4 lb_f fluid-oz./gram at 2/3 cup height and ¼ inch sidewall deflection.
- 5 28. The stackable tumbler according to Claim 25, having a Relative Cup Rigidity of from about 1.4 to about 2 lb_f fluid-oz./gram at 2/3 cup height and ¼ inch sidewall deflection.
- 10 29. The stackable tumbler according to Claim 20, having a Rigidity of at least 4 lb_f at 2/3 cup height and 1 inch sidewall deflection.
30. The stackable tumbler according to Claim 29, having a Rigidity of at least 5 lb_f at 2/3 cup height and 1 inch sidewall deflection.
- 15 31. The stackable tumbler according to Claim 20, wherein the tumbler has a generally circular cross-section.
- 20 32. The stackable tumbler according to Claim 20, wherein the tumbler has a cross-sectional shape selected from the group consisting of non-circular ovals, rounded polygons and combinations of curved and linear segments forming a closed perimeter.
33. A method of making a blow-molded tumbler comprising:
- 25 (a) injection-molding a preform provided with a neck portion, a body portion and a bottom portion;
- (b) blow-molding the preform to form a first intermediate article therefrom wherein the preform is expanded radially as well as axially,
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the first intermediate article being characterized by having a neck portion corresponding to the neck portion of the preform, a transition portion adjacent the neck portion of the first intermediate article and a tumbler portion adjacent the transition portion thereof, the tumbler portion of the first intermediate article being further characterized by having a base formed from the bottom portion of the preform and a sidewall formed from the body portion of the preform;

(c) severing the tumbler portion of the first intermediate article from its transition portion to form a second intermediate article having a base corresponding to the base of the first intermediate article and a sidewall extending upwardly therefrom to define an upper aperture, the aperture being generally larger in area than the base of the second intermediate article such that the tumbler portions are stackable; and

(d) fortifying the sidewall of the second intermediate article around the upper aperture to form the tumbler.

34. The method according to Claim 33, wherein the step of blow-molding the preform includes stretching the preform with a solid or hollow stretch rod.

35. The method according to Claim 33, further comprising the step of heating the preform after it is injection-molded and prior to blow-molding thereof.

36. The method according to Claim 33, wherein said first intermediate article has a blow-up ratio of at least about 3 with respect to said preform.

37. The method according to Claim 36, wherein said first intermediate article has a blow-up ratio of at least about 5 with respect to said preform.

38. The method according to Claim 37, wherein said first intermediate article has a blow-up ratio of from about 7.5 to about 14 with respect to said preform.
39. The method according to Claim 38, wherein said first intermediate article has a blow-up ratio from about 9 to about 12 with respect to said preform.
40. The method according to Claim 33, wherein the tumbler has a generally circular cross-section.
41. The method according to Claim 33, wherein the tumbler has a cross-sectional shape selected from the group consisting of non-circular ovals, rounded polygons and combinations of curved and linear segments forming a closed perimeter.
42. The method according to Claim 33, wherein said preform comprises a PET polymer.
43. The method according to Claim 42, wherein said preform consists essentially of polyethylene terephthalate.
44. The method according to Claim 43, wherein said polyethylene terephthalate has an intrinsic viscosity of from about 0.55 to about 1.05.
45. The method according to Claim 44, wherein said polyethylene terephthalate has an intrinsic viscosity of about 0.72 or greater.
46. The method according to Claim 33, wherein said preform has a weight of from about 10 grams to about 200 grams.
47. The method according to Claim 46, wherein the preform has a weight of from about 25 grams to about 100 grams.

48. The method according to Claim 46, wherein said tumbler has a contained volume of at least about 7 fluid oz.
49. The method according to Claim 48, wherein said tumbler has a contained volume of from about 7 to about 64 fluid oz.
50. The method according to Claim 49, wherein the tumbler has a contained volume of greater than 20 fluid oz.
51. The method according to Claim 50, wherein the tumbler has a contained volume of greater than 30 fluid oz.
52. The method according to Claim 33, wherein said tumbler has an outward taper from its base to its upper aperture of from about 2° to about 12°.
53. The method according to Claim 52, wherein said tumbler has an outward taper from its base to its upper aperture of from about 3° to about 8°.
54. The method according to Claim 52, wherein the tumbler has a reverse taper over a portion of its sidewall.
55. The method according to Claim 52, wherein the tumbler has a generally smooth sidewall adjacent its fortified rim, free from thread features.
56. The method according to Claim 52, wherein the fortified rim of the tumbler has a lateral thickness of from about 1.5 to about 10 times the thickness of the adjacent sidewall.
57. The method according to Claim 33, wherein the tumbler sidewall has a wall caliper of generally from about 0.005 inches to about 0.1 inches.

58. The method according to Claim 57, wherein the tumbler has a wall caliper of generally from about 0.025 inches to about 0.09 inches.
59. The method according to Claim 58, wherein the tumbler has a wall caliper of generally from about 0.04 inches to about 0.08 inches.
60. The method according to Claim 33, wherein said first intermediate article is provided with a circumferential cutting notch joining the transition portion with the tumbler portion.
61. The method according to Claim 33, wherein the transition portion of the first intermediate article is provided with a circumferential groove adapted to receive a drive member for rotating the article during the step of severing the tumbler portion therefrom.
62. The method according to Claim 33, wherein the tumbler comprises a polyethylene terephthalate polymer and lip curl is provided with a curling tool maintained at a temperature of from about 275°F to about 350°F around the upper aperture of the second intermediate article.
63. The method according to Claim 62, wherein the tumbler comprises a polyethylene terephthalate polymer and lip curl is provided with a curling tool maintained at a temperature of from about 285°F to about 330°F around the upper aperture of the second intermediate article.
64. The method according to Claim 33, wherein the step of fortifying the sidewall of the second intermediate article around the upper aperture comprises applying a rim-forming member to the sidewall around the upper aperture.
65. The method according to Claim 64, wherein said rim-forming member comprises the same material as the tumbler.

66. The method according to Claim 64, wherein said rim-forming member is an end unit including a lid portion.
- 5 67. The method according to Claim 66, wherein at least a part of said lid portion is removable.
68. The method according to Claim 67, wherein said lid portion includes a removable pull-tab.
- 10 69. The method according to Claim 64, wherein said rim-forming member has U-shaped profile.
70. The method according to Claim 64, wherein the sidewall of the tumbler
15 around the upper aperture is configured to have a downwardly projecting U-shaped terminal portion interlocked with an upwardly projecting U-shaped terminal portion of the rim-forming member.
71. The method according to Claim 33, wherein the tumbler portion of the first
20 intermediate article is provided with a flange projecting outwardly from its sidewall joining the tumbler portion of the first intermediate article to the transition portion thereof and wherein the flange is incorporated into the fortified rim about the upper aperture of the tumbler.
- 25 72. The method according to Claim 71, wherein the flange of the first intermediate article projects outwardly and downwardly toward the base thereof.
73. The method according to Claim 33, wherein the tumbler portion of the first
30 intermediate article is provided with a flange projecting inwardly from its sidewall joining the tumbler portion of the first intermediate article to the

transition portion thereof and wherein the flange is incorporated into the fortified rim about the upper aperture of the tumbler.

74. The method according to Claim 73, wherein the flange of the first intermediate article projects inwardly and downwardly toward the base thereof.

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75. The method according to Claim 33, wherein the preform is an unthreaded preform.

10 76. A stackable tumbler produced by blow-molding a preform wherein the preform is expanded radially and axially to form the tumbler which is characterized by a sidewall, an upper aperture and a base wherein the upper aperture is of generally larger area than the base and the sidewall is provided with a fortified rim around the upper aperture.

15 77. The tumbler according to Claim 76, having a generally circular cross-section.

20 78. The tumbler according to Claim 76, wherein the tumbler has a cross-sectional shape selected from the group consisting of non-circular ovals, rounded polygons and combinations of curved and linear segments forming a closed perimeter.

79. The tumbler according to Claim 76, comprising a PET polymer.

25 80. The tumbler according to Claim 76, consisting essentially of polyethylene terephthalate.

81. The tumbler according to Claim 80, wherein said polyethylene terephthalate has an intrinsic viscosity of from about 0.55 to about 1.05.

30 82. The tumbler according to Claim 81, wherein the polyethylene terephthalate has an intrinsic viscosity of 0.72 or greater.

83. The tumbler according to Claim 76, having a weight of from about 10 to about 200 grams.
- 5 84. The tumbler according to Claim 83, having a weight of from about 25 grams to about 100 grams.
85. The tumbler according to Claim 76, having a contained volume of at least about 7 fluid oz.
- 10 86. The tumbler according to Claim 85, having a contained volume of from about 7 to about 64 fluid oz.
87. The tumbler according to Claim 76, having a contained volume of greater than 20 fluid oz.
- 15 88. The tumbler according to Claim 76, having a contained volume of greater than 30 fluid oz.
- 20 89. The tumbler according to Claim 76, having an outward taper from its base to its upper aperture of from about 2 to about 12°.
90. The tumbler according to Claim 89, having an outward taper from its base to its upper aperture of from about 3 to about 8°.
- 25 91. The tumbler according to Claim 89, wherein the tumbler has a reverse taper over at least a portion of its sidewall.
92. The tumbler according to Claim 89, wherein the tumbler has a generally smooth sidewall adjacent its fortified rim, free from thread features.
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93. The tumbler according to Claim 92, wherein the fortified rim of the tumbler has a lateral thickness of from about 1.5 to 10 times the thickness of the adjacent sidewall.

5 94. The tumbler according to Claim 76, wherein the sidewall has a wall caliper of from about 0.005 inches to about 0.1 inches.

95. The tumbler according to Claim 94, wherein the sidewall has a wall caliper of from about 0.025 inches to about 0.09 inches.

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96. The tumbler according to Claim 95, wherein the sidewall has a wall caliper of from about 0.04 inches to about 0.08 inches.

97. A method of making a blow-molded tumbler comprising:

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(a) injection-molding a preform provided with a neck portion, a body portion and a bottom portion;

(b) blow-molding the preform to form a first intermediate article therefrom wherein the preform is expanded radially as well as axially,

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the first intermediate article being characterized by having a neck portion corresponding to the neck portion of the preform, a transition portion adjacent the neck portion of the first intermediate article and a tumbler portion adjacent the transition portion thereof, the tumbler portion of the first intermediate article being further characterized by having a base formed from the bottom portion of the preform and a sidewall formed from the body portion of the preform;

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- (c) heat-setting the first intermediate article in the mold by controlling the temperature of the blow-mold and the residence time of the first intermediate article in the mold;
- 5 (d) severing the tumbler portion of the first intermediate article from its transition portion to form a second intermediate article having a base corresponding to the base of the first intermediate article and a sidewall extending upwardly therefrom to define an upper aperture, the aperture being generally larger in area than the base of the second
- 10 intermediate article such that the tumbler portions are stackable; and
- (e) fortifying the sidewall of the second intermediate article around the upper aperture to form the tumbler.
- 15 98. The method according to Claim 97, wherein the preform comprises a PET polymer.
99. The method according to Claim 98, wherein the PET polymer in the sidewall of the tumbler has a % crystallinity of from about 25% to about 45%.
- 20 100. The method according to Claim 99, wherein the PET polymer in the sidewall of the tumbler has a % crystallinity of from about 35% to about 42%.
101. The method according to Claim 98, wherein the temperature of the blow-
- 25 mold at its portion corresponding to the sidewall of the tumbler is maintained at a temperature of from about 200°F. to about 325°F.
102. The method according to Claim 101, wherein the temperature of the blow-
- 30 mold at its portion corresponding to the sidewall of the tumbler is maintained at a temperature of from about 250°F. to about 280°F.

103. The method according to Claim 102, wherein the temperature of the blow-mold at its portion corresponding to the base of the tumbler is maintained at a temperature of at least about 150°F.
- 5 104. The method according to Claim 103, wherein the temperature of the blow-mold at its portion corresponding to the base of the tumbler is maintained at a temperature of at least about 165°F and at a temperature less than the temperature of the mold at its portion corresponding to the sidewall of the tumbler.
- 10 105. The method according to Claim 97, wherein the residence time is from about 0.5 seconds to about 5 seconds.
- 15 106. The method according to Claim 105, wherein the residence time is from about 1 second to about 3 seconds.
107. The method according to Claim 97, wherein the preform is a multilayer preform.
- 20 108. The method according to Claim 107, wherein the preform comprises a polypropylene layer and a PET layer and the temperature of the blow-mold at its portion corresponding to the sidewall of the tumbler is maintained at a temperature of from about 250°F to about 280°F.
- 25 109. A method of making a blow-molded tumbler comprising:
- (a) injection-molding a multilayer preform provided with a neck portion, a body portion and a bottom portion;
- 30 (b) blow-molding the preform to form a first intermediate article therefrom wherein the preform is expanded radially as well as axially,

5 the first intermediate article being characterized by having a neck portion corresponding to the neck portion of the preform, a transition portion adjacent the neck portion of the first intermediate article and a tumbler portion adjacent the transition portion thereof, the tumbler portion of the first intermediate article being further characterized by having a base formed from the bottom portion of the preform and a sidewall formed from the body portion of the preform;

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(c) severing the tumbler portion of the first intermediate article from its transition portion to form a second intermediate article having a base corresponding to the base of the first intermediate article and a sidewall extending upwardly therefrom to define an upper aperture, the aperture being generally larger in area than the base of the second intermediate article such that the tumbler portions are stackable; and

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(d) fortifying the sidewall of the second intermediate article around the upper aperture to form the tumbler.

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110. The method according to Claim 109, wherein said multilayer preform contains a barrier layer.

25 111. The method according to Claim 110, wherein the barrier layer comprises an ethylene vinyl alcohol (EVOH) polymer.

112. The method according to Claim 110, wherein the barrier layer comprises a vinylidene chloride polymer.

30 113. The method according to Claim 110, wherein the barrier layer comprises a polyamide polymer.

114. The method according to Claim 109, wherein the preform comprises a thermally conductive layer.
115. The method according to Claim 109, wherein at least two contiguous layers of the preform consist of different polymer compositions defining a low adhesion interface subject to delamination upon formation of the tumbler.
116. The method according to Claim 115, wherein one of the contiguous layers consists essentially of PET and the other contiguous layer consists essentially of polypropylene.
117. The method according to Claim 109, wherein at least two contiguous layers of the preform comprise reactive agents to promote delamination of the layers.
118. The method according to Claim 117, wherein one of the contiguous layers comprises a first component of a foaming composition and the other contiguous layer comprises a second component of a foaming composition.
119. The method according to Claim 118, wherein the first component of the foaming composition is sodium bicarbonate and the second component of the foaming composition is citric acid.
120. The method according to Claim 109, wherein the multilayer preform contains at least two contiguous layers of polymer with a common monomeric repeat unit.
121. The method according to Claim 120, wherein the common monomeric repeat unit is propylene residue.

122. The method according to Claim 109, wherein an outer layer of the preform is formed of a polymer having a lower glass transition temperature than an inner polymeric layer of the preform.

5 123. A method of making a blow-molded tumbler comprising:

- (a) injection-molding a preform provided with a neck portion, a body portion and a bottom portion wherein said preform comprises a polymer selected from the group consisting of: polystyrene;
10 polycarbonate; styrene; acrylonitrile; polyvinyl chloride; polyolefin polymers including polypropylene, cyclic polyolefin copolymers, polyethylene, polybutylene polymers and the like; polyamide polymers; polysulfones; polyacetals; polyacrylates; styrene-acrylonitrile copolymers; polyolefin ionomers; degradable polymers
15 and mixtures of two or more of the foregoing;
- (b) blow-molding the preform to form a first intermediate article therefrom wherein the preform is expanded radially as well as axially,
- 20 the first intermediate article being characterized by having a neck portion corresponding to the neck portion of the preform, a transition portion adjacent the neck portion of the first intermediate article and a tumbler portion adjacent the transition portion thereof, the tumbler portion of the first intermediate article being further
25 characterized by having a base formed from the bottom portion of the preform and a sidewall formed from the body portion of the preform;
- (c) severing the tumbler portion of the first intermediate article from its
30 transition portion to form a second intermediate article having a base corresponding to the base of the first intermediate article and a

sidewall extending upwardly therefrom to define an upper aperture, the aperture being generally larger in area than the base of the second intermediate article such that the tumbler portions are stackable; and

- 5 (d) fortifying the sidewall of the second intermediate article around the upper aperture to form the tumbler.

124. The method according to Claim 123, wherein said preform comprises a biodegradable polymer.
- 10 125. The method according to Claim 124, wherein the biodegradable polymer is polylactic acid.
126. The method according to Claim 124, wherein the biodegradable polymer is polyhydroxybutyrate.
- 15 127. The method according to Claim 124, wherein the biodegradable polymer is polycaprolactone.
- 20 128. The method according to Claim 124, wherein the preform is formed from a mixture of PET with one or more polymers selected from the group consisting of: polylactic acid; polyhydroxybutyrate and polycaprolactone.
129. The method according to Claim 123, wherein said preform is formed of polycarbonate.
- 25 130. The method according to Claim 123, wherein said preform is formed of polystyrene.
- 30 131. The method according to Claim 123, wherein said preform is formed of polypropylene.

132. The method according to Claim 123, wherein the preform is formed of styrene acrylonitrile copolymer.
133. The method according to Claim 123, wherein the preform comprises a
5 cycloolefin copolymer.
134. The method according to Claim 133, wherein the cycloolefin copolymer is a copolymer of norbornene and an acyclic olefin.
- 10 135. The method according to Claim 123, wherein the preform comprises a blend of a cycloolefin copolymer and an ethylene polymer selected from the group consisting of high density polyethylene, low density polyethylene and linear low density polyethylene.
- 15 136. The method according to Claim 123, wherein the preform comprises a nanocomposite comprising a polyamide polymer and nanoparticles.
137. A method of making a blow-molded tumbler comprising:
- 20 (a) injection-molding a preform provided with a neck portion, a body portion and a bottom portion;
- (b) blow-molding the preform to form a first intermediate article therefrom wherein the preform is expanded radially as well as axially,
- 25 the first intermediate article being characterized by having a neck portion corresponding to the neck portion of the preform, a transition portion adjacent the neck portion of the first intermediate article and a tumbler portion adjacent the transition portion thereof,
- 30 the tumbler portion of the first intermediate article being further characterized by having a base formed from the bottom portion of

the preform and a sidewall formed from the body portion of the preform;

5 (c) severing the tumbler portion of the first intermediate article from its transition portion to form a second intermediate article having a base corresponding to the base of the first intermediate article and a sidewall extending upwardly therefrom to define an upper aperture, wherein the sidewall has a thickness of at least about 0.025 inches around the upper aperture to define a rim thereabout, the aperture being
10 generally larger in area than the base of the second intermediate article such that the tumbler portions are stackable; and

(d) optionally smoothing the rim of the second intermediate article around the upper aperture to form the tumbler.

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138. The method according to Claim 137, wherein the step of blow-molding the preform includes stretching the preform with a solid or hollow stretch rod.

139. The method according to Claim 137, further comprising the step of heating
20 the preform after it is injection-molded and prior to blow-molding thereof.

140. The method according to Claim 137, wherein the tumbler has a wall caliper of generally from about 0.025 inches to about 0.09 inches.

25 141. The method according to Claim 140, wherein the tumbler has a wall caliper of generally from about 0.04 inches to about 0.08 inches.

142. A method of making a blow-molded tumbler comprising:

30 (a) injection-molding a preform provided with a rim portion, a body portion and a bottom portion;

(b) blow-molding the preform to form a tumbler therefrom wherein the preform is expanded radially as well as axially,

5 the tumbler being characterized by having a rim portion corresponding to the rim portion of the preform and being further characterized by having a base formed from the bottom portion of the preform and a sidewall formed from the body portion of the preform;

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(c) the sidewall extending upwardly from the base to define an upper aperture, the aperture being generally larger in area than the base of the second intermediate article such that the tumbler portions are stackable; and

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(d) wherein the rim portion extends around the upper aperture of the tumbler.

143. The method according to Claim 142, wherein the step of blow-molding the preform includes stretching the preform with a solid or hollow stretch rod.

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144. The method according to Claim 142, further comprising the step of heating the preform after it is injection-molded and prior to blow-molding thereof.

25 145. The method according to Claim 142, wherein said first intermediate article has a blow-up ratio of at least about 3 with respect to said preform.

146. The method according to Claim 145, wherein said first intermediate article has a blow-up ratio of at least about 5 with respect to said preform.

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147. The method according to Claim 142, wherein the rim is from about 1.2 to 5 times the thickness of the adjacent sidewall of the tumbler.
148. The method according to Claim 147, wherein the rim is from about 1.5 to about 3 times the thickness of the adjacent sidewall.
149. The method according to Claim 148, wherein the tumbler has a generally circular cross-section.
150. The method according to Claim 148, wherein the tumbler has a cross-sectional shape selected from the group consisting of non-circular ovals, rounded polygons and combinations of curved and linear segments forming a closed perimeter.
151. A method of making a blow-molded tumbler comprising:
- (a) injection-molding a preform consisting essentially of PET provided with a neck portion, a body portion and a bottom portion;
- (b) blow-molding the preform to form a first intermediate article therefrom wherein the preform is expanded radially as well as axially,
- the first intermediate article being characterized by having a neck portion corresponding to the neck portion of the preform, a transition portion adjacent the neck portion of the first intermediate article and a tumbler portion adjacent the transition portion thereof, the tumbler portion of the first intermediate article being further characterized by having a base formed from the bottom portion of the preform and a sidewall formed from the body portion of the preform;

- (c) heat-setting the first intermediate article in the mold by controlling the temperature of the blow-mold and the residence time of the first intermediate article in the mold; and
- 5 (d) severing the tumbler portion of the first intermediate article from its transition portion to form a second intermediate article having a base corresponding to the base of the first intermediate article and a sidewall extending upwardly therefrom to define an upper aperture, wherein the sidewall has a thickness of at least about 0.025 inches
- 10 around the upper aperture to define a rim thereabout, the aperture being generally larger in area than the base of the second intermediate article such that the tumbler portions are stackable.
152. The method according to Claim 151, wherein the PET polymer in the
- 15 sidewall of the tumbler has a % crystallinity of from about 25% to about 45%.
153. The method according to Claim 152, wherein the PET polymer in the
- 20 sidewall of the tumbler has a % crystallinity of from about 35% to about 42%.
154. The method according to Claim 151, wherein the temperature of the blow-mold at its portion corresponding to the sidewall of the tumbler is maintained at a temperature of from about 200°F. to about 325°F.
- 25 155. The method according to Claim 154, wherein the temperature of the blow-mold at its portion corresponding to the sidewall of the tumbler is maintained at a temperature of from about 250°F. to about 280°F.

156. The method according to Claim 155, wherein the temperature of the blow-mold at its portion corresponding to the base of the tumbler is maintained at a temperature of at least about 150°F.
- 5 157. The method according to Claim 156, wherein the temperature of the blow-mold at its portion corresponding to the base of the tumbler is maintained at a temperature of at least about 165°F and at a temperature less than the temperature of the mold at its portion corresponding to the sidewall of the tumbler.
- 10 158. The method according to Claim 151, wherein the residence time is from about 0.5 seconds to about 5 seconds.
- 15 159. The method according to Claim 158, wherein the residence time is from about 1 second to about 3 seconds.
160. The method according to Claim 151, wherein the tumbler has a wall caliper of generally from about 0.025 inches to about 0.09 inches.
- 20 161. The method according to Claim 160, wherein the tumbler has a wall caliper of generally from about 0.04 inches to about 0.08 inches.